Hypogaeic Mealybugs of the Hawaiian Islands (Homoptera : Pseudococcidae)[1]

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The hypogaeic mealybugs, those of true subterranean habit occurring solely on the roots of their host plants, form a fairly well-defined subdivision within the family Pseudococcidae. The purpose of this paper is to give new taxonomic and distributional information on the known Hawaiian representatives of this group.

The hypogaeic mealybugs of the world were monographed by E. J. Hambleton (1946). Both Hambleton and Zimmerman (1948) record only two species from Hawaii. Of these, one has been misidentified in our literature and the other incorrectly placed to genus. In addition, a third species is known to be established here.

Although these small cryptic insects are seldom collected, my studies indicate that they are a common and widely distributed element of our soil fauna and, at times, may become abundant enough to adversely affect their plant hosts.

The hypogaeic mealybugs differ from most Pseudococcidae in possessing short, 4–6 segmented, usually geniculate, antennae set relatively close together on the head; short, often spinose legs; in lacking definite cerarii; and in possessing a particular type of specialized wax pore consisting of 2 or 3 small tubular ducts arranged in a partial spiral on a raised, usually triangular-shaped tubercle (tritubular or bitubular pores). With the exception of *Rhizoecus falcifer* Kunckel d'Herculais (which is not present in Hawaii), males are apparently unknown in this group.

Key to Hypogaeic Mealybugs Known from the Hawaiian Islands

(Mature females)

1. Anal lobes protuberant and strongly sclerotized, each bearing a large sclerotized spine at its apex; a pair of somewhat smaller spines dorsally at apex of abdomen between bases of anal lobes; and a pair of similar spines on dorsum of head ... . **Geococcus coffeae**

   Anal lobes not noticeably protuberant or sclerotized; without such large sclerotized spines 2

2. Multilocular disc pores present on posterior portion of venter of abdomen.....**Rhizoecus advenus**

   Multilocular disc pores absent.....**Rhizoecus hawaiiensis**

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1. **Geococcus coffeae** Green.

Geococcus coffeae Green, 1913, STYLOPS 2:54. Williams, 1958, BULL. BRITISH MUS. (Nat. Hist.) ENT. 6(8):225, Fig. 7. Beardsley, 1959, PROC. HAW. ENT. SOC. 17(1):10.

Geococcus radicum, Fullaway, 1910, PROC. HAW. ENT. SOC. 2(3): 108, pl. 4 (misident.). Zimmerman, 1948, INSECTS OF HAWAII 5:158 (misident.).

Previously (1960), I have called attention to the misidentification of *G. coffeae* as *G. radicum* in Hawaii. Williams (1958) redescribed and figured *G. coffeae*, and all the known Hawaiian specimens support his concept very well. Williams pointed out that *G. radicum* from Ceylon differs from *G. coffeae* in lacking the pair of sclerotized spines between the anal lobes, and in possessing differently shaped tritubular pores.

Distribution: Described originally from Dutch Guiana, this species probably is distributed widely in the tropics. It has been reported from Ceylon, Gold Coast (Africa), the Palau Islands (Micronesia), and the Hawaiian Islands, where it has been collected on Oahu and Hawaii.

Hosts: Roots of many plants. In Hawaii, recorded from *Acacia koa*, *Cladium*, coffee, croton, *Cyperus rotundus*, ferns, *Gerbera*, *Indigofera anil*, mango, oleander, palms, and pineapple. The type host is coffee.

2. **Rhizoecus advenus** Beardsley (Fig. 1).

Rhizoecus advenus Beardsley, 1965, INSECTS OF MICRONESIA 6(7): 468, Fig. 22.

This species, presumably an immigrant to Hawaii, was described from specimens collected at the Experiment Station, HSPA, in Honolulu, on roots of ti (*Cordyline terminalis*). A specimen from Truk in the Caroline Islands appears conspecific.

R. advena may be distinguished from the similar *R. hawaiiensis* by the possession of ventral multilocular disc pores, slightly more elongate antennae, and more numerous tritubular pores.

3. **Rhizoecus hawaiiensis** (Hambleton), **new combination** (Fig. 2).

Radicoccus hawaiiensis Hambleton, 1946, REV. DE ENT. (Argentina) 17 (1&2): 48. Zimmerman, 1948, INSECTS OF HAWAII 5: 158.

Ripersiella sp., Beardsley, 1959, PRO. HAW. ENT. SOC. 17 (1): 18.

Hambleton (1948) used the absence of eyes and the generally stout, almost circular body form of the type species of *Radicoccus*, *Rhizoecus globosus* James, to separate this genus from *Ripersiella* Tinsley. However, *R. hawaiiensis* actually possesses neither of these characteristics. In this species, the body form is definitely elongate oval, as in most hypogaeic mealybugs; and although the eyes are extremely small and often difficult to locate, they are discernible in nearly every specimen seen by me. During 1964, I examined the type material of *R. hawaiiensis* in the U.S. National Museum. This consists of two slide-mounted specimens, both labeled "ex roots of Coleus, Manoa Valley, Honolulu, T. H., E. M. Ehrhorn collector".

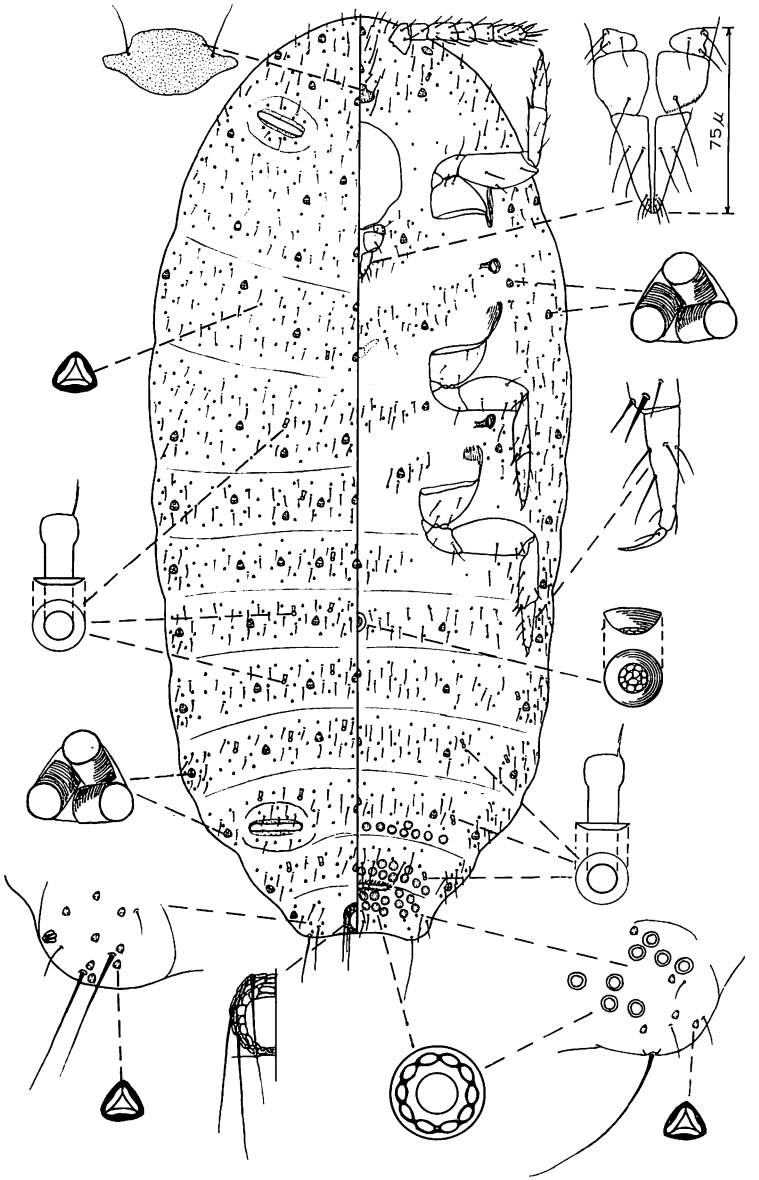

Figure 1. *Rhizoecus advenus* Beardsley.

The holotype is unstained and lacks both antennae except for the 2 basal joints. The second specimen is stained reasonably well, and the eye on one side of the head is clearly discernible. The type specimens were compared with specimens collected at various localities on Oahu during the past several years, and no significant differences were found.

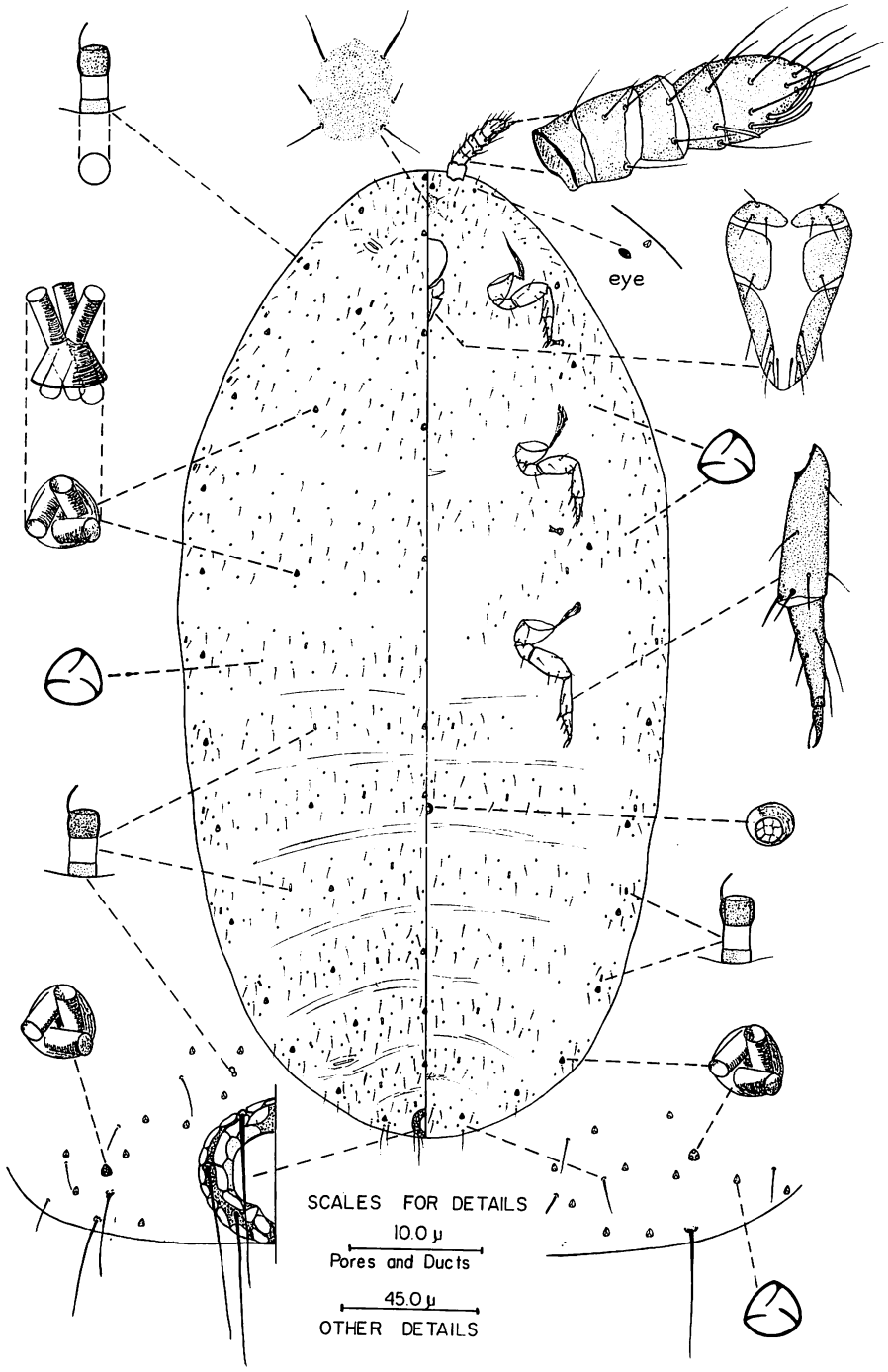

Figure 2. *Rhizoecus hawaiiensis* (Hambleton)

Ferris (1953: 426) pointed out that characters such as number of antennal segments and length of the tarsal claw digitules used by Hambleton to distinguish between certain genera, are unsatisfactory due to existence of intermediate forms. Ferris, therefore, assigned to the genus *Rhizoecus* the various North American species which Hambleton had placed in genera such as *Coccidella* Hambleton, and *Ripersiella*. *R. hawaiiensis* clearly falls within Ferris' concept of the genus *Rhizoecus*, where it is placed here.

Previously, *R. hawaiiensis* has been known only from the type collection. During the past several years, I have taken this mealybug on the roots of several hosts at various localities on Oahu, and on the leeward Hawaiian Islands of Nihoa and Necker. On Oahu this species is common and widely distributed. The species is possibly an immigrant, although its origin remains unknown.

Specimens that follow were examined. Oahu: Wiliwilinui Ridge, 500 ft., VI. 58. on roots of *Peperomia leptostachya*; Ewa, IV. 59. roots of *Sonchus oleraceus*; Wailupe Valley, V and IX. 60, on roots of *Bidens pilosa*; Honolulu, Round Top, II. 65, Berlese funnel extraction from leaf litter. Nihoa: IX. 64, ex roots of *Portulaca lutea* and *Chenopodium oahuense*. Necker: VI. 62, on roots of *Chenopodium oahuense*.

LITERATURE CITED

BEARDSLEY, J. W. 1959. Note on *Geococcus coffeae* Green. PROC. HAW. ENT. SOC. 17 (1): 10.

—1959. Note on *Ripersiella* sp. IBID. 17 (1): 18.

FERRIS, G. F. 1953. Atlas of Scale Insects of North America. Vol. VI. PSEUDOCOCCIDAE Part II. i-vii, 279–506. Stanford Univ. Press.

HAMBLETON, E. J. 1946. Studies of Hypogaeic Mealybugs. REV. DE ENT. 17 (1–2): 1–77, Figs.

WILLIAMS, D. J. 1958. The Mealybugs (Pseudococcidae: Homoptera) described by W. M. Maskell, R. Newstead, T. D. A. Cockerell and E. E. Green from the Ethiopian Region. BULL. BRITISH MUS. (Nat. Hist.) ENT. 6 (8): 205–236, Figs.

ZIMMERMAN, E. C. 1948. INSECTS of HAWAII. Vol. 5. Homoptera: Sternorhyncha. vi + 464 pp., Figs. Univ. of Hawaii Press, Honolulu.